

for combining the  $n$  signal channels, and optical amplifier for amplifying the output of the signal combiner, a multichannel wavelength selective filter with variable per channel loss for blocking channels not carrying signals to be added to the network or controlling the amplitude of the added signals, and an add coupler for coupling the add path to the  
5 network.

The invention also provides a method of adding an  $n$ -channel DWDM signal to an  $n$ -channel DWDM network combining signals from a plurality of signal sources to provide an  $n$ -channel add signal output, amplifying the combined output, selectively blocking  
10 wavelength channels of the combined signal not carrying signals to be added onto the network or controlling the amplitude of the added signal, and coupling the  $n$ -channel add signal onto the optical network.

In an embodiment of the invention, the wavelength selective filter attenuates  
15 channels carrying signals to be added to the network to control their amplitude.

Preferably, the selective band pass filter comprises an  $n$ -channel demultiplexer having  $n$  outputs, an  $n$  channel multiplexer having  $n$  inputs and a variable optical attenuator arranged between each of the demultiplexer outputs and multiplexer inputs, wherein the  
20 variable attenuator on any given channel is set to block the signal on that channel if no signal on that channel is to be added onto the network.

By demultiplexing the channels of the amplified output of the add signal combiner, a variable optical attenuator can be used on each channel selectively to filter out the

CLAIMS

1. An optical network node for an n channel DWDM optical network, the node comprising an add path for adding an n-channel wavelength multiplex onto the network, in which some of the n channels carry signals to be added onto the network, wherein the add path comprises an n-channel signal combiner for combining the n signal channels, and optical amplifier for amplifying the output of the signal combiner, a multichannel wavelength selective filter with variable per channel attenuation for blocking channels not carrying signals to be added to the network or controlling the amplitude of the added signals, and an add coupler for coupling the add path to the network.
2. An optical network node according to claim 1, wherein the selective band pass filter comprises an n-channel demultiplexer having n outputs, an n channel multiplexer having n inputs and a variable optical attenuator arranged between each of the demultiplexer outputs and multiplexer inputs, wherein the variable attenuator on any given channel is set to block the signal on that channel if no signal on that channel is to be added onto the network and the channel is not used to control the amplitude of the added signals.
3. An optical network node according to any of claims 1 to 2, comprising means for running the sources of the n-channel signals at maximum power.
4. A DWDM optical communications network having a plurality of nodes according to any of claims 1 to 3.

5. A method of adding an n-channel DWDM signal to an n-channel DWDM network combining signals from a plurality of signal sources to provide an n-channel add signal output, amplifying the combined output, selectively blocking wavelength channels of the combined signal not carrying signals to be added onto the network or controlling the amplitude of the added signals, and coupling the n-channel add signal onto the optical network.
6. A method according to claim 5, comprising running the signal sources at full power to optimise the optical signal to noise ratio of the signal added to the network.
7. A method according to any of claims 5 or 6, comprising demultiplexing the combined amplified add signal using an n-channel demultiplexer, passing each of the output channels of the demultiplexer through a variable optical attenuator (VOA) and multiplexing the VOA outputs to form the network add signal.
8. A method according to claim 7, wherein the non-signal carrying channels are blocked by attenuating to zero the outputs from the demultiplexer corresponding to those channels.